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Research Article

LEAD BIOACCUMULATION IN WHOLE BODY TISSUES OF FRESH WATER GASTROPOD SNAIL, BELLAMYA BENGALENSIS AFTER CHRONIC LEAD INTOXICATION

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ABSTRACT
The objective of present study was carried out to determine the level of bioaccumulation of heavy metal salt lead (Pb) in freshwater gastropods snail's *Bellamya bengalensis.* The bioaccumulation of heavy metal salts in snail's was studied under two groups. Group A was maintained as control, group B snail's were exposed to chronic LC $_{50/10}$ dose of lead nitrate (6.753 ppm) for 21 days. Bioaccumulation level in whole body tissues of *Bellamya bengalensis*'from A and B groups were collected after every seven days and were dried at 80^{oc} in an oven till costant weight was obtained.The sample were analysed on the instrument atomic absorption sepctrophotometer (Chemito). It was found that the freshwater snail, *Bellamya bengalensis* showed the highest concentration of lead as compared to control, lead contamination of the aquatic ecosystems affect the life of the snails, altering their metabolic functions. Hence, a scientific detoxification method is essential to improve the health of economic species of snail's in any stressed environmental conditions (accidental or induced discharges of heavy metal).

Keywords*:Chronic Lead Intoxication, Bioaccumulation, Fresh Water Snail*

INTRODUCTION
In aquatic ecosystem, heavy metals are considered as the most important pollutants, since they are present throughout the ecosystem and are detectable in critical amounts. Generally, metals enter the fresh water bodies from a variety of sources, including: rocks and soils directly exposed to waters, dead and decomposing vegetation and animal matter, wet and dry fallout of atmospheric particulate matter and human activities, including the discharge of various treated and untreated wastes to the water body (Abo *et al.,* 2005). Non-essential metals are usually potent toxins and their bioaccumulation in tissues lead to intoxication, decreased fertility, tissue damage and dysfunction of a variety of organs (Oliveira *et al*., 2000; Damek-Proprawa and Sawicka-Kapusta, 2003) Balkas (1982) reported that, heavy metal pollution of terrestrial and aquatic ecosystems have long been recognized as a serious environmental concern. This is largely due to their non-biodegradability and tendency to accumulate in plants and animals tissues. As a result, metal bioaccumulation is a major route through which increased levels of the pollutants are transferred across food chains/web, creating public health problems wherever man is involved in the food chain (Tuzen, 2003; Otitoloju and Don-Pedro, 2002, 2004).
Lead (pb) is a heavy metal which occurs naturally or result from industrial contamination, or be leached from lead pipes in some water systems. Lead is widely used in paint industry, pigments, dyes, electrical components, plastic chemicals and in various other industries (Hodson *et al.,* 1984). Since some of the Pb salts are soluble in water, presents a potential threat to aquatic organisms. However enrichment of Pb within an aquatic organisms and it's transfer through food chain constitute a danger to man.The strong attraction between metal ions and organic ligands influence the deposition of metals in the body and their rate of excretion, consequently, with continuing intake, it tends to accumulate to a high degree in the body of molluse (Harrison, 1969; Simkiss and Mason, 1983). The bioaccumulation of heavy metals in the different fish tissues has been studied by several investigators (Filazi *et al.,* 2003 and Ashraf, 2005). Owing to the gastropods' potential characteristics as biomonitors of heavy metal pollution, this study focused on snail, *Bellamya bengalensis*. The objective of the present study was to determine the heavy metal concentrations of Pb in whole body.

MATERIALS AND METHODS

The snail, bellamya bengalensis were acclimatized to laboratory condition for 2-3 days and healthy active snail's of approximately medium size and weight were chosen. These snail's were divided into two groups, such as group A and B. The snail's of group A were maintained as control. The snail's from group B were exposed to chronic concentration (LC 50 value of 96 hr/10) of heavy metal salt, lead nirtate (6.753 ppm) upto 21 days. During experimentation snails were fed on fresh water algae. The whole body mass of snails from all groups were collected after every seven days and were dried at 80 c in an oven till constant weight was obtained. The 500 mg sample was taken for digestion. The tissue was digested in 10 ml of acid mixture (HCL:HNO_3 in (3:1) ratio) on hot plate till dryness. The digested mixtures were kept in water bath for 6-7 hours until the samples were cooled. Cool digested samples were filtered (Whatman grade 541). The total volume was diluted to 50 ml by double glass distilled water in volumetric flask. The sample were analysed on the instrument atomic absorption sepctrophotometer (Chemito). The concentration of Pb accumulation in the tissue of each exposure period was recorded and the results are given in the table.

RESULTS AND DISCUSSION

Observation and Results

Lead contents in *Bellamya bengalensis* after exposure to concentrations of lead nitrate (6.753 ppm) up to 21days. After 7, 14 and 21 days of chronic exposure to heavy metal, it was observed that there was an increase in concentration of accumulated heavy metals in the body of *B. bengalensis* with respect to time as compared to those of control snails.

The accumulation data from table and Figure indicates that the concentration of bioaccumulated lead in presence of $PbNO_3$ (6.753ppm) increased with increse in exposure period as compared to control. The lead content is expressed in μgm/kg. dry weight. The control group of animals showed minute quantity of lead as compared to the experimental groups. The control group of animal showed 730.0 μgm/kg, lead in whole body tissue while the bioaccumulated lead in presence of $PbNO_3$ (6.753 ppm) after 7 days exposure was 1792.0μgm/kg. The concentration in the tissues was raised after 14 days to 2652.0μgm/kg, while after 21 days increases to 3646.0μgm/kg. There was more change in the bioaccumulation of Pb in control animals.

Table 1: Lead content (μgm/kg dry weight) in whole body of *bellamya bengalensis* (lamarck) after chronic treatment of lead nitrate

Treatment	Sr No.	Body Tissue	Hg content (μgm/kg dry weight) 7 Days	14 Days	21 Days
(A) Control	i	W.B.	**730.00**	**730.00**	**724.00**
(B) 6.753 ppm $PbNO_3$	ii	W.B.	**1792.00 + 59.263•**	**2652.00 + 72.473•**	**3646.00 + 71.714•**

W.B.- Whole Body / • -Compared with respective A

Discussion

In the present study, the freshwater gastropod snail's *Bellamya bengalensis* were exposed to LC50/10 concentrations of for twenty one days in the laboratory to examine the effects of the heavy metals on their survival and their fate through their soft parts. From the obtained results it is clear that the analysis of the investigated gastropods snail's (whole body tissue's) indicated that these organisms can accumulate Pb in high concentrations in their whole bodies, so they can be used as bioindicators for heavy metals pollution in aquatic ecosystems. Bakre and Garg (1994) studied bioaccumulation of Pb in experimentally exposed freshwater mollusc, *Pila globosa* and maximum accumulation was found in Intestive, followed by digestive gland and less degree of accumulation of Pb occured in mantle and foot. The accumulation of Pb increased with increasing exposure period. According to the Gundacker (1999), a zebra mussel accumulates high amounts of potentially toxic metals and was widely used as a bio-monitoring organism. Avelar *et al.,* (2000) reported that Oyster and mussels can accumulate Cd in their tissues at levels up to 100,000 times higher than the levels observed in the water in which they live. Passow *et al.,* (1961) reported that lead can induce synthesis of specific proteins which selectively bind them. Inhibition of enzyme activities by heavy metals is either due to the direct binding with enzyme protein or due to damage of cell organelles or by toxic effect produced. The specific amoebocytes and or digestive vesicles within the cell may engulf metals outside the cell membrance (i.e. in the human digestive tract), then move back into the tissue carying their particulate burden (Owne *et al.,* 1966).

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